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Discussion on Integration of Urban Video Surveillance System

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Abstract

The video surveillance system in urban security is playing an increasingly important role. With the continuous development of internet video surveillance, monitoring of range is constantly expanding. In the city-level video surveillance system, it's necessary to integrate the systems using different monitoring ways. The entire city's surveillance system is made into a unified management, which can provide service for urban security effectively. The video surveillance system of integration schemes are analyzed and discussed in the paper.

Keywords: Urban Security, Video Surveillance, Integration

1. Introduction

Starting from the original analog closed-circuit television monitoring, the video surveillance system experienced the development of digitalization and networking, and it strides forward to direction of distributive and intelligent.

In recent years, as the network bandwidth, computer processing power and storage capacity increased rapidly and the emergence of video information processing [a] technology, the advantages of full

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digitalization and networking video surveillance become apparent[1,2]. Its high degree of openness, integration and flexibility creates conditions for improving overall performance of the video surveillance systems and equipments, and provides more broad development space, new application model and emerging market opportunities for the whole security industry. With the continuous development and popularization of the safe city's construction, the problem is how to integrate the urban monitoring systems constructed in different stages. There are several reasons making the video surveillance system integration complex, such as different construction time, different monitoring models and different equipments in different monitoring systems. To solve the problem, the existing monitoring methods are analyzed and how to integrate the different monitoring systems effectively is discussed in the paper.

2. Existing video surveillance system

2.1. Analog video surveillance system

In the analog video surveillance system, image transmission, exchange and storage are based on analog signal processing technology, which adopts coaxial cable in short distance and fiber video optical transceiver in long distance. Image exchange is accomplished by video matrix or video distributor. Image storage adopts magnetic tape machine. Pictorial display is based on the monitor. Operating the keyboard achieves the PTZ control of front camera. The analog video monitoring has some advantages in the effect of image restoration, but it's only suitable for providing terminal access because of its disadvantages, such as limited transmission distance, complex engineering wiring, susceptible to interference signals, inflexible application, unable to concentrate management.

2.2. Digital surveillance system

In the digital surveillance system, the digital image files are transmitted by computer network transmission system. So that, the existing computer LAN even Internet is available for transmission and browsing of the digital image. Using the network system of computer terminals not only monitors the field goal, but also can send control signals to control the camera and zoom lens, so that the traditional centralized monitoring system is transformed into the distributed monitoring system.

Advanced digital signal processing technology is introduced into the digital video surveillance. There are essential differences between the digital video surveillance and the analog video surveillance at the aspects of signal transmission, control and storage. In the digital video surveillance system, using the efficient video encoding technology such as MPEG-4、H264, monitoring images can realize the long distance transmission in all kinds of existing digital transmission network with low bandwidth. PLZ control of the front camera and pictorial display can be accomplished by PC, and the image storage is based on computer hard disk. Digital video surveillance is an innovation in the security field, and it exceeds the analog video surveillance at the aspects of long distance transmission engineering wiring operation maintenance and flexible application. However, digital video surveillance itself is a very broad concept. It mainly reflects the innovation of signal processing technology and does not involve system structure.

2.3. Network remote surveillance system

Network video surveillance is based on digital signal processing. It uses networking way to realize signal transmission、exchange、control、video storage and on-demand playback, and through the establishment of strong center business platform, it realize the unified management and centralized control

of the entire coding-decoding devices video storage device within the system. For users, just logging on central business platform can achieve unification transfer and browsing of the entire net monitoring resources. Network video surveillance reflects not only the innovation of technology but also the innovation of frame. Through referencing and learning from the advanced、mature communication network architecture, the network video monitoring will have promoting affect at least two aspects: the one is to establish and improve the standardization of digital video surveillance, the other one is to integrate the traditional security and communication industry

The promoting effects will lead the entire security industry to a standardized、large-scale direction, and bring more vast market space to the video surveillance. The Fig.1 shows the general layered network diagram of network monitoring system:

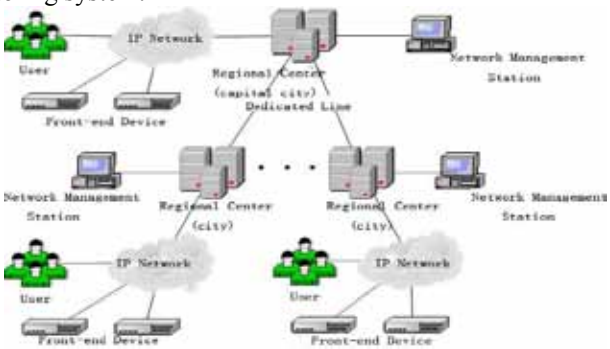

Fig1. Layered System Network Diagram

From the above diagram, each regional center is cascaded up through circuits of quality assurance (distribution of certain bandwidth); this part is the equipment of monitoring center. Construction of each regional center is independent and it can develop customers independently, regional center can be unlimited number of layers set up in theory. Through the cascade of the regional center, it is satisfied for development of cross-regional users. In principle, users and user equipment are managed nearby, audio and video data are also saved nearby. It is propitious to ensure the improvement of customer service quality and provides effective bandwidth usage and bandwidth management.

The main advantages of network video surveillance embodied in the following areas:

(1) Hierarchical architecture

Network video surveillance reference mature design concept of the traditional communication, and adopt clear、hierarchical architecture. The architecture will benefit establishment and improvement of standardization of digital video surveillance, and realize integration with traditional communication net. It is very benefit for the terminal users or the entire security industry.

(2) Integrated management and control

Network video surveillance strengthen the functions of central business platform, it can realize entire resources' unified management and centralized such as inside the system encoding、decoding、video storage and user. It effectively solved the problem that kinds of video surveillance system resources were dispersed in the past. On the one hand, it is propitious to simplify the design of front-end equipment and reduce the investment cost. On the other hand it is convenient for centralized maintenance、reducing the system operation and maintenance、and at the same time improving stability and security of system.

(3) Unified business interface

In the network video surveillance system, as long as the network arrives, the user can land the central service platform through the client software, the business application and management functions can be realized, such as achieving real-time monitoring of all monitoring points' image within system, replaying

of all stored information, PTZ control of front-side camera. To all the users, the system provides a unified interface; the only difference will lie in the different user to have the different operation jurisdiction. Therefore, network video monitoring system can be greatly enhanced the operational convenient and flexibility.

(4) Deployment of distributed systems

Network video surveillance system enables the distributed deployment of central business platform, all the function modules of which can be configured and cut, and can integrated run on the same set of operating systems and hardware, and can be also distributed in the different operating systems and different hardware. Through the distributed deployment, the system can realize large-capacity smooth expansion and application of multistage cascade large-scale network.

(5) Network storage playback

Network video storage and retrieval of playback are important characteristics of network video surveillance system. In the network video surveillance system, video unit and storage space can be distributed deployment, including central video (through the center of the network video unit), sub-center video (through the sub-center network video unit), and front-end video (saving local video in the encoding device). In order to facilitate calls and browsing of these distributed video materials for users, the network video surveillance system can unified manage all the video resources through the central business platform, the user can login system for centralized searching these video resources and on-demand playback in any place, the user does not need to know the deployment of the video and storage unit.

3. Urban surveillance system integration schemes

3.1. Urban surveillance systems facing the main problem

At present, the large-scale network video surveillance service application is more and more widespread. In the construction of urban video surveillance system, many units and departments have been established different video surveillance systems. The video surveillance systems adopt different encoding methods and different monitoring models, which definitely will have difficulties in integrating the video surveillance systems. Future urban video surveillance system must relay on network for large-scale monitoring. Based on the analysis of existing monitoring models and encoding technology, the following problems are faced in framing urban surveillance system:

Different ways of monitoring

So as to satisfy the needs of local monitoring, there are many early constructions of analog surveillance system, which is short of transmission distance and uses local storage. It requires transformation because of urban monitoring system through network transmits video signals with digital methods. In addition, though lots of existing digital surveillance systems adopt digital means. Because of meeting local requirements, it uses local storage and need additional equipments to transmit through network.

Not uniform encoding format

Encoding format is the core technology of video surveillance targets and requirements. Different CODEC formats are used in different periods of digital surveillance systems. Even using the same CODEC formats, but because the CODEC devices are different, which has difficulty in integrating urban video surveillance.

Based on the analysis of the urban video surveillance system and related technology, different video surveillance systems can be integrated through the following ways, so as to make the entire urban video surveillance interchange and manage effectively.

3.2. Integration of the analog surveillance system

To analyze the signals of today's surveillance system is to analyze both digital signals and analog signals. It's easy to integrate the analog system. After the urban video surveillance center has decided the video CODEC format, encoding needed follow the unified standard. Adding the standard CODEC device in the analog surveillance system center, the video server sends video signals to urban monitoring center.

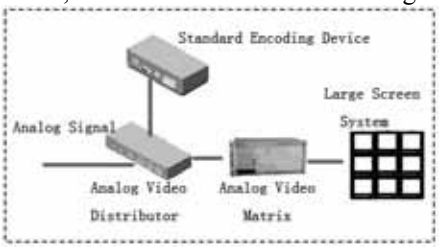

Fig 2.Convert Analog video signal to standard Digital video signal

3.3. Integration of the digital surveillance system

Integration of the digital surveillance system is more complex. Because of different CODEC formats and different devices, it will bring difficulties to integration of surveillance system. And the integration and reform can not affect the operation of existing surveillance system. It's necessary to analyze used CODEC format which is the same with standard CODEC format. The video image code must be unified. If encoding format is same, signal is directly sent to urban surveillance center with the digital matrix or other means. Else, it's necessary to carry on corresponding decoding, then signal is sent to urban surveillance center after encoding follow the standard code format.

4. Conclusions

From the previous analog surveillance to the present digital surveillance; From behind site monitoring to advanced remote monitoring; From someone on duty to the present unmanned surveillance system, video surveillance is moving toward digital, network and scale. With the development of city's modernization, video surveillance will inevitably become the primary means of urban security. Integration of urban video surveillance system is necessary for future urban security. The present surveillance formats and integration of different surveillance systems are discussed and analyzed in this paper.

Acknowledgements

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